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May 10, 2001

Mr. Thomas L. King
Office of Nuclear Regulatory Research
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

DOCKET: Project 713

RE: Regulatory Issues Related to the Pebble Bed Modular Reactor (PBMR)

Dear Mr. King:

As you know, Exelon Generation (Exelon) is currently participating in a detailed feasibility study of the PBMR. If the results of this study are favorable, Exelon intends to seek the regulatory approval required to construct and operate a PBMR as a merchant power plant in the United States. As discussed in the meeting with NRC on April 30, 2001, Exelon has identified a number of NRC regulations that could pose an undue and unintended burden when applied to a gas-cooled modular reactor facility or merchant plants. This letter provides the basis for that discussion.

In general, NRC regulations governing nuclear power plants were developed for large light water reactors (LWRs) owned and operated by electric utilities. For the most part, these regulations were not designed for and do not contemplate gas-cooled modular reactor facilities being operated as merchant plants. The regulations creating potential burdens include the following:

- License requirements in 10 CFR § 50.10
- Financial protection requirements in 10 CFR Part 140
- Decommission funding requirements in 10 CFR § 50.75(e)
- Requirements for an antitrust review under 10 CFR § 50.33a
- Requirements on annual fees in 10 CFR Part 171
- Operator staffing requirements in 10 CFR § 50.54(m)
- Minimum decommissioning costs in 10 CFR § 50.75(c)
- Fuel cycle impacts in 10 CFR Part 51
- Financial qualifications in 10 CFR § 50.33(f)

The enclosed position papers summarize the additional burden that each of these requirements could impose on the PBMR, Exelon's proposals concerning actions the NRC could take to eliminate or mitigate those burdens, and the reasons why those actions are in accordance with NRC's legal authority under the Atomic Energy Act of 1954, as amended. We have not included a paper on emergency planning as indicated in our meeting because existing NRC emergency planning regulations provide latitude for NRC to address gas-cooled reactors on a case-by-case basis.

The attached table summarizes Exelon's proposals with respect to these regulations. For the first PBMR facility, Exelon will include within its license application a request for an exemption from most of these regulations, and in other cases will provide information to resolve the matters addressed by the

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per Amy Cubbage

regulations. To avoid the need for such actions for subsequent PBMR applications (and other new nuclear plants), Exelon believes that NRC should initiate rulemaking to revise the regulations to accommodate gas-cooled reactors, modular reactors, and merchant plants. In general, these rulemakings should occur as part of a single, integrated rulemaking structured to address licensing of new plants. We believe that such rulemaking would be in accordance with COMJSM-00-003 dated February 13, 2001, in which the Commission stated that the staff should critically assess the existing regulatory infrastructure related to licensing of new plants and identify possible enhancements.

For present purposes, Exelon requests the NRC to review the attached position papers and to meet with Exelon to discuss NRC's preliminary views regarding Exelon's proposals. Exelon will need this information in connection with the preparation of the PBMR application if the results of the detailed feasibility study are favorable. More importantly, NRC's views related to issues such as financial protection, decommissioning funding, and annual fees may affect the results of the detailed feasibility study itself and Exelon's decision to proceed with the PBMR. Therefore, it is especially important for Exelon to obtain early NRC views on these issues by June. Additionally, since NRC's regulations ordinarily require submission of antitrust information nine months prior to an application for a construction permit or combined license, and since collection of the required antitrust information involves substantial effort, Exelon also needs to obtain NRC's views related to the conceptual acceptability of Exelon's proposal on this matter by June.

In particular, in our follow-on discussions in June, Exelon would like to explore NRC's views on the following questions:

- If Exelon provides the information and justifications discussed in the attached position papers, is Exelon's proposal conceptually acceptable to the NRC?
- In addition to the information and justifications discussed in the papers, is there any other information or justifications that NRC would need to accept Exelon's proposal?

Thank you for your consideration and assistance in connection with PBMR matters. We look forward to working with you to address and resolve these important regulatory issues related to the PBMR.

Sincerely,

James A. Muntz
Vice President, Nuclear Projects

cc: William Travers, EDO
Samuel Collins, Director NRR
Ashok Thadani, Director RES
William Borchardt, Associated Director NRR
Richard Barrett, NRR
Janice Moore, OGC
Stuart Rubin, RES
Amy Cubbage, NRR
Diane Jackson, NRR

SUMMARY OF EXELON'S PROPOSALS

Regulation	**Exelon's Proposal**	***Exemption Request* for First Application?**	**Rulemaking Recommended For Subsequent Applications?**
Requirement that nuclear reactors have a license under 10 CFR § 50.10	Issue a single license for a facility with multiple modules.	No, unless NRC believes that it cannot issue a single license for multiple modules.	Yes.
Financial protection requirements in 10 CFR Part 140	Treat multiple modules at a site as a single nuclear facility for purposes of financial protection.	Yes, unless NRC considers a modular facility to be a single nuclear reactor.	Yes, to clarify that a modular facility may be treated as a single nuclear reactor.
Decommissioning funding requirements in 10 CFR § 50.75(e)	Allow use of partial pre-payment with a 20-year external sinking fund for decommissioning. [1]	No, unless NRC finds that partial prepayment with an external sinking fund does not satisfy 10 CFR § 50.75(e)(vi).	Yes, to identify additional acceptable funding methods, such as partial prepayment with an external sinking fund.
Requirements for an antitrust review under 10 CFR § 50.33a	Create a class of merchant plants exempt from antitrust review.	No, unless NRC does not create a class of merchant plants excepted from antitrust review under Section 105(c)(7) of the Atomic Energy Act by the end of 2001.	Yes, to confirm that a merchant plant meeting certain criteria is not required to submit antitrust information or undergo an antitrust review.
Requirements to pay annual fees in 10 CFR Part 171	Treat multiple modules at a site as a single facility for purposes of annual fees.	No, given the lead time until operation of the first PBMR, it should be possible to resolve this issue by rulemaking prior to operation.	Yes.
Operator staffing requirements in 10 CFR § 50.54(m)	Establish operator staffing requirements specifically for the PBMR.	Yes.	Yes, at least as part of the design certification rule for the PBMR.
Decommissioning costs under 10 CFR § 50.75(c)	Provide an estimate of the decommissioning costs for a PBMR module.	No.	No

1 This is one alternative that Exelon is currently evaluating. There may be other alternatives that are also acceptable or even preferable.

Regulation	**Exelon's Proposal**	***Exemption Request* for First Application?**	**Rulemaking Recommended For Subsequent Applications?**
Environmental impacts of fuel cycle under 10 CFR Part 51	Identify the specific impacts of the fuel cycle and transportation attributable to the PBMR in a manner analogous to 10 CFR §§ 51.51 and 51.52 for LWRs. 10 CFR § 51.23 is applicable to and resolves the Waste Confidence issue for the PBMR.	No. Currently, these sections are only applicable to light water reactors. No.	Yes, at least as part of design certification rulemaking for the PBMR. No.
Financial qualifications under 10 CFR § 50.33(f)	Provide information on financial qualifications.	No.	Yes, to identify criteria that, if satisfied, would establish the financial qualifications of an applicant for a merchant plant.

Note: This table only addresses resolution of issues through exemptions and rulemaking. It does not discuss possible statutory changes that could resolve some of these issues.

NUMBER OF LICENSES AS APPLICABLE TO A PEBBLE BED MODULAR REACTOR (PBMR) FACILITY

I. ISSUE:

The Atomic Energy Act (AEA) contains a number of provisions related to issuance of licenses for reactors:

- Section 101 of the AEA and 10 CFR § 50.10(a) prohibit a person from possessing or using a "utilization facility" except as authorized by a license issued by the Commission. The Commission's regulations in 10 CFR § 50.2 define "utilization facility" as a nuclear reactor. If each PBMR module is treated as a separate nuclear reactor, each individual module could require a separate license.
- Section 161(h) of the AEA and 10 CFR § 50.52 grant the Commission the authority to "combine in a single license" activities that would typically be licensed separately. This paper discusses how these various regulations should be reconciled for a PBMR facility consisting of multiple modules.

II. EXELON'S PROPOSAL:

1) In the first PBMR license application, Exelon will apply for a single license for multiple PBMR modules.

2) Independently of the PBMR licensing proceeding, the NRC should initiate rulemaking to clarify that a set of modules may be treated as a single nuclear facility for licensing and other purposes.

III. ANALYSIS:

Section 101 of the AEA requires a person to obtain a license to possess or use a "utilization facility." Section 11(cc) of the AEA defines the term "utilization facility" as any equipment or device capable of making use of special nuclear material or peculiarly adapted for making use of atomic energy in such quantity as to be of significance to the common defense and security or health and safety of the public. This definition is broad, and could be interpreted as including a set of integrated modules.

10 CFR § 50.2 is more specific, and defines "utilization facility" as "any nuclear reactor." A "nuclear reactor" is defined by 10 CFR § 50.2 as "an apparatus, other than an atomic weapon, designed or used to sustain nuclear fission in a self-supporting chain reaction." Under this section, each module could be classified as a "nuclear reactor."

Neither Section 101 of the Atomic Energy Act nor the corresponding provisions in 10 CFR § 50.10(a) requires that each utilization facility have a separate license -- instead, both the Act and the regulation make it unlawful for a person to possess or use a utilization facility except as authorized by a license issued by the Commission. Therefore, the Commission could, consistently with the language of both Section 101 of the Act and Section 50.10 of the regulations, issue a single license for multiple modules.[1]

Furthermore, Section 161(h) of the AEA states that the Commission may consider in a single application one or more activities for which a license is

required. Additionally, 10 CFR § 50.31 states that an applicant may combine several applications for different licenses into one application. This provision has often been used to submit a single application for construction permits or operating licenses for multiple reactors at a single site. Therefore, existing regulations permit Exelon to file a single application for multiple modules at a site.

Additionally, Section 161(h) of the AEA and 10 CFR § 50.52 state that the Commission may combine in a single license the activities of an application which would otherwise be licensed separately. These provisions are typically used to combine licenses for radioactive materials issued under 10 CFR Parts 30, 40, and 70 with an operating license for a single reactor issued under Part 50. However, nothing in the language or legislative history of the AEA or the Commission's regulations would preclude the Commission from combining two or more Part 50 licenses for multiple modules into a single license.

Exelon believes that issuing a single license for multiple PBMR modules would have several beneficial effects. First, issuance of a single license for multiple modules would enable the modules to be treated legally, as well as practically, as a single nuclear facility. As discussed in Exelon's position paper on "Financial Protection Requirements Under the Price-Anderson Act and 10 CFR Part 140 as Applicable to a Pebble Bed Modular Facility," the requirements imposed by Part 140 would be prohibitively burdensome, if applied to each module rather than to a PBMR facility as a whole. Additionally, as discussed in other papers,

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[1] We could find nothing in the legislative history of the Atomic Energy Act that directly discusses whether a single license may be issued for more than one reactor, or whether more than one

requirements on annual fees in Part 171 and operator staffing in 10 CFR § 50.54(m) would be unduly burdensome if applied to each module. These problems would be ameliorated if multiple modules were subject to a single license. Furthermore, issuance of a single license for a facility consisting of multiple modules would have other benefits, such as administrative efficiency and promotion of standardization among the modules.

It is important to note that 10 CFR Part 52 appears to contemplate issuance of a single license for multiple modules. In particular, 10 CFR § 52.103(g) states:

> Prior to operation of the facility, the Commission shall find that the acceptance criteria in the combined license [COL] are met. *If the combined license is for a modular design*, each reactor module may require a separate finding as construction proceeds. (Emphasis added)

Under this provision, a single COL could be issued for multiple modules prior to commencement of construction, and the Commission would make a separate pre-operational finding for each module or set of modules as its construction is completed.[2]

Therefore, Exelon believes that NRC may issue a single license for multiple modules given the existing language in the Atomic Energy Act and the Commission's regulations. To avoid uncertainty for future license applications for modular reactor facilities, NRC should initiate rulemaking to expand the

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reactor may be treated as a single utilization facility.

[2] The licensing of a modular facility under Part 50 could be more complex due to the two- step licensing process. The Commission could issue a single construction permit for multiple modules. Upon completion of the construction of the first module or first set of modules (and any requisite hearings), the Commission could issue an operating license (OL) for all of the modules; however, pending completion of construction of the other modules, the OL would only authorize operation of the first module or first set of modules. As construction of each additional module or set of modules is completed, the NRC would provide an opportunity for hearing, make the requisite finding under 10 CFR § 50.57(a)(1), and amend the OL to authorize operation of the module or set of modules in question.

definitions of utilization facility and nuclear reactor in 10 CFR § 50.2 to include multiple modular reactors at a site. For the purpose of the definitions, Exelon suggests that the total size of a modular reactor facility be limited to no more than 1500 MWe (which would bound the size of a PBMR facility, which is expected to consist of up to 10 modules each with a rated capacity of between 100 and 150 MWe).

FINANCIAL PROTECTION REQUIREMENTS UNDER THE PRICE-ANDERSON ACT AND 10 CFR PART 140 AS APPLICABLE TO A PEBBLE BED MODULAR REACTOR (PBMR) FACILITY

I. ISSUE:

The Price-Anderson Act imposes certain financial protection requirements on each licensee of a nuclear "facility," which includes a maximum retrospective premium of almost $90 million in the event of a nuclear incident involving a nuclear plant in the United States. NRC's implementing regulations impose these requirements on each "nuclear reactor," so that a licensee would be liable for a maximum retrospective premium of nearly $90 million *per reactor*. 10 CFR § 140.11. If NRC were to impose this requirement on each module, a 10-module PBMR nuclear facility would have a potential liability of almost $900 million. This amount is greatly disproportionate to the potential liability for other reactor facilities of similar size, and runs counter to the intent of the Act in spreading the risk of liability across the industry.

II. EXELON'S PROPOSAL:

1) For the first PBMR application, Exelon will request an exemption from the requirements of 10 CFR § 140.I1. Exelon will request that NRC treat a 10-module PBMR facility as one nuclear "facility" within the meaning of the Price-Anderson Act.

2) Independently of the licensing of the PBMR, the NRC should initiate rulemaking to provide that a multiple module facility is a single "facility" under the Price-Anderson financial protection requirements.

III. ANALYSIS:

A. Potential Liability of a PBMR under 10 CFR Part 140

The Price-Anderson Act is included in Section 170 of the Atomic Energy Act (AEA), 42 U.S.C. § 2210. It contains a comprehensive statutory scheme intended to: (1) protect the public against losses from personal injury or property damage arising out of nuclear incidents involving the design, construction, operation or maintenance of nuclear facilities, or the handling or use of nuclear materials; and (2) encourage the development of the nuclear industry by limiting the total liability arising out of any nuclear incident and protecting and indemnifying any person, or entity, who might otherwise be liable, against personal liability in this area by spreading the risk of liability about the industry.

Under Section 170(b) of the Act, the amount of primary financial protection required for facilities designed for producing substantial amounts of electricity and having a rated capacity of 100,000 electric kilowatts [100 MWe] or more must be equal to the maximum amount of commercially available nuclear liability insurance. 42 U.S.C. § 2210(b). This amount is currently $200 million. In addition to this primary financial protection, Section 170(b) requires licensees of such facilities to participate in an industry retrospective rating plan, or secondary layer of protection. This secondary protection provides for the assessment of additional deferred premiums in the event that the public liability from a nuclear incident exceeds the primary financial protection required of the licensee involved in the incident. *Id*

At the present time, the total amount of financial protection available under the Act from both the primary and secondary layers is about $9.7 billion, as follows: (1) the

primary layer of $200 million; and (2) a secondary layer of approximately $9.5 billion, based upon a maximum retrospective premium of $88.095 million per nuclear incident per nuclear facility. Under Section 170(b) of the AEA, the maximum amount of the standard deferred premium that may be charged per year to a licensee is $10 million for each facility for which [the] licensee is required to maintain the maximum amount of primary financial protection.

10 CFR § 140.11 requires that financial protection be provided for each *nuclear reactor*. This requirement has significant implications for modular facilities such as the PBMR. If a multiple module PBMR facility is not treated as a single licensed nuclear "facility" for purposes of Price-Anderson, Exelon's potential liability in the event of a nuclear incident at another plant would be multiplied by the number of modules at a site. For example, if the maximum retrospective premium charge of $88.095 million were applied on a per module basis, a ten-module facility would be subject to additional retrospective assessments of more than $880 million for each PBMR facility, for each nuclear incident at another plant. Neither Exelon nor its lenders would find this acceptable. Without relief, 10 ten-module facilities would assume secondary financial liability roughly equal to the entire financial protection that is available under Price-Anderson today. This result would be contrary to the intent of the Price-Anderson Act in spreading the risk of liability across the industry.

B. Legal Authority of the Commission to Treat Multiple Modules as a Single Facility for Purposes of the Price-Anderson Act

The imposition of such disproportionate liability on a PBMR facility is not required by the Price-Anderson Act. Under the Act, the NRC has the authority to treat multiple modules at a site as a single nuclear facility.

Although 10 CFR § 140.11 imposes financial protection requirements on each "nuclear reactor," the Price-Anderson Act is not so restrictive. Section 170(a) of the AEA requires each "license" to have a condition requiring the "licensee" to maintain financial protection. Section 170(b) of the AEA requires each "licensee" to have primary financial protection for "facilities" and to have a secondary layer of financial protection "for facilities designed for producing substantial amounts of electricity and having a rated capacity of 100,000 electrical kilowatts or more."

Thus, Section 170 of the AEA and 10 CFR § 140.11(a)(4) contain similar provisions, except that the Act pertains to "licenses," "licensees," and "facilities," while the Commission's regulations pertain to "nuclear reactors." As discussed below, the rulemaking history of 10 CFR § 140.11 and the legislative history of the Price-Anderson Act do not suggest that each nuclear reactor must be treated as a single licensed nuclear "facility" under the Price-Anderson Act.

1. Rulemaking History

Nowhere in the rulemaking history of 10 CFR Part 140 is there any suggestion that each nuclear reactor must be treated as a single licensed nuclear facility under the Price-Anderson Act. *See generally* Financial Protection Requirements and Indemnity Agreements, 26 Fed. Reg. 2944 (to be codified at 10 CFR Part 140) (Apr. 7, 1960); 24 Fed. Reg. 3508 (proposed May 1, 1959); 25 Fed. Reg. 6681 (proposed Aug. 28, 1958); 24 Fed. Reg. 7223 (proposed Sept. 11, 1957).[1]

[1] Both 10 CFR § 50.2 and § 140.2 define "nuclear reactor" narrowly as any apparatus used to sustain nuclear fission in a self-supporting chain reaction. If the Commission had intended the term "nuclear reactor" (with such a narrow defini tion) to represent the only interpretation of such a broad term as "facility" as used in the Act, the Commission would presumably have discussed this matter in these Federal Register notices. Because the Commission did not do so, its use of the term "nuclear reactor" in the regulations presumably represents an exercise of the Commission's rulemaking discretion rather than a statutory interpretation of the term "facility."

To the contrary, the Commission has treated an entire site (rather than each reactor on the site) as a single facility for some purposes under the Price-Anderson Act. For example, 10 CFR § 140.11(b) states that primary financial protection [i]n any case where a person is authorized pursuant to part 50 of this chapter to operate two or more nuclear reactors at the same location must only be in the amount of the highest amount which would otherwise be required for any of those reactors: *Provided*, That such primary financial protection covers all reactors at the location. The Commission originally adopted this provision requiring only one primary policy for each site because the insurance syndicates have advised that the nuclear energy liability policies which they are planning to issue will cover nuclear hazards arising out of the possession, disposal, or use of special nuclear material at a described location. 24 Fed. Reg. at 3510.

Thus, the rulemaking history of the NRC regulations implementing the Act suggests that a PBMR with multiple modules on a single site could be treated as a single nuclear facility under the Price-Anderson Act.

2. Legislative History

The legislative history of the Act supports the conclusion that the Commission is free to interpret multiple modules as a single nuclear "facility" under the Price-Anderson Act. The term "facility" as used in Section 170 is not defined. Therefore, the Commission has discretion in providing its own definition, consistent with the intent of the Act.

Furthermore, even if the term "facility" were interpreted as meaning "utilization facility," the definition of "utilization facility" in the AEA is sufficiently broad to allow the

Commission to treat multiple modules as a single "utilization facility." Section 11(cc) of the AEA defines that term as follows:

> any equipment or device except an atomic weapon, determined by rule by the Commission to be capable of making use of special nuclear material in such quantity as to be of significance to the common defense and security, or in such manner as to affect the health and safety of the public, or peculiarly adapted for making use of atomic energy in such quantity as to be of significance to the common defense and security, or in such manner as to affect the health and safety of the public

42 U.S.C. 11(cc). There is nothing in this language that would prevent the Commission from treating multiple modules as a single utilization facility. Furthermore, there is nothing in the legislative history that would prevent the Commission from treating multiple modules or reactors as a single utilization facility. [2]

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In conclusion, a careful reading of the legislative and rulemaking history in this area demonstrates that there is no legal or statutory barrier to the NRC amending or clarifying Part 140 to treat multiple PMBR modules as a single PBMR nuclear "facility" for purposes of the Price-Anderson Act.

C. Appropriate Treatment of the PBMR under the Price-Anderson Act

For the first PBMR application, NRC should grant an exemption from 10 CFR § 140.11, so that the PBMR facility is treated similarly to an equivalent sized light water reactor (LWR). In particular, Exelon's potential liability for retrospective premiums *in the*

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[2] During the drafting and debates concerning the Price -Anderson Act and the subsequent amendments to the Act that created the secondary layer of protection, the words "reactor" and "facility" were sometimes used interchangeably. *See, e.g.,* 103 Cong. Rec. 10711 (daily ed. Jul. 1, 1957 (statement of Rep. Price); *Hearings Before the Joint Committee on Atomic Energy*, 84th Cong. 109 (1956) (statement of Charles H. Weaver, Vice -President of Westinghouse Electric Corp); S. Rep. No. 85-296 (1957), *reprinted in* 1957 U.S.C.C.A.N. 1803; H.R. Rep. No. 85-435, at 20 (1957); S. Rep. No. 94-454 (1975), p. 9, *reprinted in* 1975 U.S.C.C.A.A.N. 2251, 2259. However, since a reactor is undoubtedly a utilization facility, and since the concept of modular

event of an accident at another plant should not be substantially higher than the liability of an equivalent sized LWR, merely because Exelon is using a modular design rather than a LWR design. As Exelon will show in its license application, the risks of a severe accident at a 10-module PBMR facility are less than the risks of a severe accident at a LWR (and therefore the risk that another nuclear plant will incur retrospective liability under the Price-Anderson Act *as a result of an accident at the PBMR facility* is less than the risk of such liability from an accident at a LWR). Exelon's application for the first PBMR application will provide additional support for such an exemption, including providing a technical justification for the exemption based upon a comparison of the risks of a PBMR facility and an LWR.

Given the flexibility provided by the Price-Anderson Act and the AEA in general, Exelon believes that NRC has the authority to grant an exemption from 10 CFR § 140.11 for the first PBMR application, and to treat multiple modules at a site as a single nuclear facility with a single license for purposes of the Price-Anderson Act (or otherwise limit the potential liability of the PBMR).

As a long term solution to this matter, NRC should initiate rulemaking to amend Section 140.11(a)(4) to state explicitly that the financial protection requirements apply to each licensee for a nuclear "facility," and that a nuclear facility may include multiple modules at a site. The definitions of utilization facility and nuclear reactor in 10 CFR § 50.2 should also be amended to include multiple reactor modules at a site. Exelon is working with the Nuclear Energy Institute to provide supporting information and justification for such rulemaking.

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reactors had not yet been developed, the interchangeable use of these terms is not particularly surprising and does not preclude multiple reactors from being treated as a single facility.

In proposing such a change in the regulations, Exelon realizes that it may be appropriate to limit the number and size of modules that may be treated as a single nuclear facility. Exelon suggests that the total size of each modular nuclear reactor facility subject to the Price-Anderson financial protection requirements be limited to no more than 1500 MWe (which would bound a 10-module PBMR facility). Such a limit provides a reasonable basis for rulemaking, by placing a modular nuclear facility on an equivalent footing with a current LWR, for purposes of the Price-Anderson Act.

DECOMMISSIONING FUNDING FOR A PEBBLE BED MODULAR REACTOR (PBMR) FACILITY

I. ISSUE:

10 CFR § 50.75 requires licensees to establish financial assurance for decommissioning. Section 50.75(e)(1) provides six methods for providing financial assurance. These methods include prepayment, an external sinking fund, surety, insurance, or other "equivalent" method. However, Section 50.75(e)(1) essentially restricts use of external sinking funds to licensees that recover decommissioning funds through rates or a non-bypassable charge. Most other licensees have used the prepayment method (e.g., licensees in license transfer proceedings).

This paper evaluates the implications of these requirements for the PBMR.

II. EXELON'S PROPOSAL:

1) The first PBMR license application will propose a decommissioning funding method for the PBMR. Exelon has not yet selected a decommissioning funding method. However, Exelon is evaluating the possibility of seeking NRC approval for an alternative decommissioning funding mechanism that provides for partial prepayment of the total decommissioning cost estimate and annual contributions for the remainder spread over 20 years. Exelon believes that such a mechanism would be permissible under Section 50.75(e)(1)(vi) as an "equivalent" method (or, at the very least, would qualify for an exemption under 10 CFR § 50.12).

2) NRC should initiate rulemaking to modify Section 50.75(e)(1) to explicitly authorize the use of this alternative funding mechanism for new plants. This rulemaking should be initiated independently of the licensing proceeding for the PBMR, and should

also address other alternative decommissioning funding methods being developed by the industry.

III. ANALYSIS:

10 CFR § 50.75(e)(1) states that financial assurance for decommissioning is to be provided by one or more of the following methods: (i) prepayment in the form of a trust, escrow account, government fund, certificate of deposit, or other payment acceptable to the NRC,

(ii) external sinking fund for a licensee that recovers the estimated cost of decommissioning through "cost of service" rates or non-bypassable charge for decommissioning costs, (iii) surety method, insurance, or other guarantee method, (iv) a statement of intent (for a federal licensee), (v) contractual obligations, and (vi) any other mechanism, or combination of mechanisms, that provides (as determined by the NRC) an assurance mechanism equivalent to the other methods in this section. Since a new PBMR modular facility would likely not recover decommissioning costs through rates or a non-bypassable charge, it would not be allowed to use the external sinking fund method under 10 CFR § 50.75(e)(1)(ii) for the PBMR.

Most license transfers to date involving sales of reactors to unaffiliated third parties have satisfied NRC's decommissioning funding assurance requirements by fully prepaying and conveying those funds to the new licensee at closing. According to the NRC, while prepayment places a significant up-front burden on licensees, prepayment provides assurance that a licensee will be able to meet its decommissioning obligations. However, if NRC were to require 100% prepayment of the decommissioning cost estimate for new plants, such prepayment might jeopardize the economic viability of any

the economic viability of any new plant that is to be operated on a merchant basis because of the higher present worth of a prepayment relative to other funding mechanisms which contemplate payment(s) at a later time.

Exelon is giving further consideration to whether some of the other funding arrangements authorized under 10 CFR § 50.75(e) may be feasible for a PBMR operated as a merchant plant by Exelon. For example, Exelon is considering the insurance option pursuant to 10 CFR § 50.75(e)(1)(iii), and long term power sales contracts that provide for the funding of decommissioning costs pursuant to 10 CFR § 50.75(e)(1)(v). Exelon is also considering some funding mechanisms being developed by the industry.

Additionally, Exelon is evaluating the economic feasibility of requiring a new PBMR to accumulate decommissioning funding on an accelerated basis during the first 20 years of operation. Use of such a funding mechanism, in which Exelon would make partial prepayment (5%, for example) of the total decommissioning cost estimate and annual contributions for the remainder spread over 20 years, would substantially reduce the initial costs associated with the PBMR while still providing assurance of funds for decommissioning at the time a module is likely to be decommissioned.

Exelon believes that such a prepayment funding mechanism would provide adequate assurance of decommissioning funding for a new plant. By definition, it will guarantee that sufficient funds are available if a plant operates for its licensed lifetime. Furthermore, partial prepayment, coupled with accelerated funding over the first 20 years of operation, is reasonable in light of the small risk of premature shutdown during that period.

In particular, according to NUREG-1350, NRC has issued more than 120 full power operating licenses for power reactors with a capacity of 100 MWe or greater. Of these, all but nine operated for approximately 20 years or longer (or are currently operating). Of these nine, five operated for more than 12.5 years; two operated for about nine years; one (Pathfinder) operated for about three years; and one (TMI-2) was closed due to an accident. This history indicates that more than 90% of power reactors have operated for approximately 20 years or longer (or are currently operating) and that all but two of the remaining plants have operated for about 9 years or longer. This history provides adequate assurance that the alternative funding method will cover the decommissioning costs at the time of termination of operation.[1]

Exelon believes that this alternative approach satisfies 10 CFR § 50.75(e)(1)(vi) which allows a licensee to provide financial assurance via "[a]ny other mechanism, or combination of mechanisms, that provides, as determined by the NRC upon its evaluation of the specific circumstances of each licensee submittal, assurance of decommissioning funding equivalent to that provided by the [enumerated] mechanisms." If NRC disagrees, however, Exelon believes that NRC could grant an exemption from Section 50.75(e)(1) to permit this alternative funding approach (or select another option).

If Exelon decides to use an alternative funding mechanism, its application for the PBMR will provide more details and a justification for the mechanism. However, if NRC

[1] Exelon recognizes that the NRC considered and rejected an accelerated funding mechanism when it revised the decommissioning funding rule in 1998. However, NRC rejected such an approach *for existing operating reactors*, many which have operated for well over twenty years. As NRC noted, an accelerated funding mechanism *for existing operating reactors* might not as sure adequate decommissioning at the end of the licensed lifetime, let alone in the event of premature shutdown. Obviously, this rationale is not applicable to newly licensed plants. The NRC did not

is conceptually opposed to use of partial prepayment with accelerated funding over twenty years (either under Section 50.75(e)(1)(vi) or as an exemption), Exelon needs to know as soon as possible so that this can be factored into Exelon's evaluation of the economic feasibility of the PBMR. Additionally, if NRC believes that there may be other acceptable funding mechanisms that can accomplish the same purpose, Exelon is willing to consider the economic feasibility of those methods. To avoid duplicative efforts for future merchant nuclear power plants, the NRC should initiate rulemaking to revise 10 CFR § 50.75(e)(1) and explicitly allow alternative approaches for new plants. Exelon is working with the Nuclear Energy Institute and other nuclear generation companies to identify a number of possible alternative funding methods and develop supporting information for use in rulemaking. This rulemaking should be initiated independently of licensing of the PBMR.

consider whether use of an accelerated funding approach would be adequate for newly licensed reactors. (63 Fed. Reg. 50461, 50469-70, September 22, 1998).

NRC ANTITRUST REVIEW AUTHORITY AS APPLICABLE TO A PEBBLE BED MODULAR REACTOR (PBMR) FACILITY

I. ISSUE:

Section 105 of the Atomic Energy Act (AEA) requires that the NRC conduct an antitrust review, seek the advice of the Attorney General, and if necessary conduct a hearing on antitrust matters in connection with applications for a construction permit (CP) or combined operating license (COL) for a nuclear power reactor. NRC's implementing regulations in 10 CFR § 50.33a provide that applicants for such licenses are required to submit to the NRC detailed transmission, distribution, and business planning information that will allow the Attorney General of the United States and NRC staff to conduct an antitrust review of the proposed project.

Pursuant to Section 105(c)(7) of the AEA, NRC has the authority, with the approval of the Attorney General, to determine that issuance of certain classes of licenses would not significantly affect the licensees' activities under the antitrust laws, and therefore except such applicants from NRC antitrust review under Section 105. Recognizing the current status of competition in the electric utility industry and the fundamental competitive realities surrounding the operation of any new merchant nuclear project, the NRC should make a determination under Section 105(c)(7) that applicants that will operate their plants as merchant plants are excepted from NRC antitrust review.

II. EXELON'S PROPOSAL:

1) The NRC should initiate a proceeding, and seek the approval of the Attorney General, to determine that the issuance of licenses to merchant plant applicants will not significantly affect such applicants' activities under the antitrust laws. NRC should make a determination pursuant to Section 105(c)(7) that merchant plant applicants are excepted from antitrust review. Any such determination should also provide appropriate criteria for determining whether an applicant qualifies as a merchant plant operator.

2) The NRC should also initiate a rulemaking to clarify that its rules do not require that a merchant plant applicant submit the antitrust information identified in 10 CFR § 50.33a. The rule should state that an applicant need only provide information sufficient for the NRC to make a determination as to whether the applicant qualifies as a member of the excepted class. This model is consistent with the approach pursued by NRC when it made its determination that it would not conduct antitrust reviews in connection with license transfers. [1]

III. ANALYSIS:

Section 105, the "Antitrust Provisions" of the AEA, requires NRC to conduct an antitrust review in consultation with the Attorney General, prior to issuing a license under Section 103 for a nuclear generating facility. In particular, Section 105 of the AEA requires the NRC to determine whether activities under the license would create or maintain a situation "inconsistent with the antitrust laws." NRC has traditionally

exercised this authority by conducting antitrust reviews and, if necessary, hearings. In some instances, these reviews and hearings have resulted in NRC imposing various antitrust conditions in the license. These conditions have often involved access to transmission.

The regulations implementing Section 105 are contained in 10 CFR Part 50. Section 50.33a, "Information requested by the Attorney General for antitrust review," states that nine

months prior to submitting its application, an applicant for a construction permit for a nuclear power reactor shall submit the information requested by the Attorney General as described in Appendix L, if the applicant has more than 200 MWe of generating capacity. Appendix L, Section II, "Required Information," lists 20 separate issues that must be addressed by the applicant in the antitrust submittal.

The antitrust review provisions of Section 105 have limited applicability to the modern electric industry, and they serve no useful purpose with respect to proposed operation of a nuclear reactor on a merchant plant basis. Changes in the electric industry – including the emergence of a competitive wholesale electric market and mandated open access to the transmission system – reduce, if not eliminate, the incremental protection of competition that the NRC provides through its antitrust review for license applications for merchant plants.

Section 105(c)(7) empowers NRC to except a class of licenses from antitrust review "as the Commission may determine would not significantly affect the applicant's

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1 *See Kansas Gas & Electric Co.* (Wolf Creek Generating Station, Unit 1), CLI- 99-19, 49 NRC 441 (1999); Final Rule, "Antitrust Review Authority: Clarification," 65 Fed. Reg. 44,649 (July 19, 2000).

activities under the antitrust laws."[2] NRC should use its existing authority under Section 105(c)(7) to provide an exception from antitrust review for merchant plant applicants that meet certain criteria, *e.g.*, Exempt Wholesale Generators (EWGs) or generators authorized to sell power at wholesale at market based rates. By definition, such merchant plants operate in a competitive environment. Additionally, EWGs do not control transmission systems. Furthermore, Federal Energy Regulatory Commission (FERC) Order 888 obligates transmission providers to file open access transmission tariffs. Additionally, there are a large number of different generating companies owning and operating merchant plants and competing in the generation market, and the construction of new generation (increasing supply) is pro-competitive. Therefore, the licensing of a merchant plant will not create any situation inconsistent with the antitrust laws.

NRC could take action to create an excepted class of licenses by order, policy statement, or rulemaking. Exelon suggests that NRC follow an approach akin to the one it took in *Wolf Creek*, wherein NRC would issue a *Federal Register* notice and solicit public comments regarding whether it should determine that the issuance of licenses to applicants who qualify as merchant plant operators would not significantly affect such applicants' activities under the antitrust laws, and therefore except such applicants from NRC antitrust review under Section 105. Upon issuance of such a

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[2] Section 106 of the Atomic Energy Act states the Commission may group facility licenses into classes "upon the basis of similarity of operating and technical characteristics of the facilities," and may define the various activities to be carried out at each class of facility and the amounts of special nuclear material available for use by each facility. There does not appear to be a connection between the term "class of facilities" as used in Section 106 and the term "class or types of licenses" as used in Section 105(c)(7). These sections were enacted more than 15 years apart, and neither Section 105(c)(7) nor its legislative history refers to Section 106. Furthermore, the language in Section 106 (which refers to "operating and technical characteristics") is simply inapposite to the type of antitrust issues addressed in Section 105.

determination, NRC could then initiate a rulemaking to clarify that its rules do not require that a merchant plant applicant submit the antitrust information identified in 10 CFR § 50.33a. The rule should state that such an applicant need only provide information sufficient for the NRC to make a determination as to whether the applicant qualifies as a member of the excepted class.

Exelon has been working with the Nuclear Energy Institute (NEI) to support the creation of the excepted class for merchant plants. We urge NRC to make such a determination prior to the end of this year, pursuant to the authority granted in Section 105(c)(7) of the AEA. If NRC does not reach a decision by the end of this year, Exelon will need to provide the required antitrust information or request an exemption from § 50.33a which will permit Exelon to defer filing of antitrust information until after NRC makes a decision on whether it will except merchant plant operators from antitrust review.

ANNUAL FEES UNDER 10 CFR § 171.15 AS APPLICABLE TO A PEBBLE BED MODULAR REACTOR (PBMR) FACILITY

I. ISSUE:

10 CFR § 171.15(a) states that each person licensed to operate a power reactor shall pay an annual fee "for each unit for each license" held at any time during the Federal fiscal year in which the fee is due. If each PBMR module is treated as a reactor, Section 171.15 could be construed so as to impose a separate fee for each module. Therefore, the annual fee for a 10-module PBMR would be greatly disproportionate to the annual fee for an equivalent sized boiling water reactor (BWR) or pressurized water reactor (PWR). This could place a modular reactor design at a competitive disadvantage with other designs and act as a disadvantage to the development of modular reactors.

II. EXELON'S PROPOSAL:

For the purposes of assessing annual fees, it is not reasonable to treat multiple PBMR modules at a site the same as multiple PWRs or BWRs at a site. NRC should initiate rulemaking to change Section 171.15 to specify that only one annual fee will be required for each facility or set of modular reactors at a given site. This rulemaking on Section 171.15 should be completed prior to issuance of the license for the first PBMR.

III. ANALYSIS:

The requirements set forth in 10 CFR Part 171 originally were promulgated in 1986. *See* 51 Fed. Reg. 24078 (July 1, 1986). The NRC enacted Part 171 to comply with the requirements of the Consolidated Omnibus Budget Reconciliation Act of 1985

which required the NRC to "assess and collect annual charges from persons licensed by the Commission pursuant to the Atomic Energy Act of 1954" in order to recover the Commission's estimated budget costs. *Id.* The NRC consequently promulgated the requirement that "[e]ach person licensed to operate a power reactor shall pay an annual fee for each power reactor unit for which the person holds an operating license" to recoup a portion of its costs. Annual Fee for Nuclear Power Reactor Operating Licenses and Conforming Amendments, 51 Fed. Reg. 33224, 33230 (Sept. 18, 1986).

When discussing the fee schedules, the NRC stated that "[t]he annual charge should be assessed under the principle that licensees who require the greatest expenditures of the agency's resources should pay the greatest annual charges." Revision of Fee Schedules, 56 Fed. Reg. 14870, 14871 (Apr. 12, 1991). *See also* 136 Cong. Rec. H 10107 (Oct. 16, 1990). Although the NRC never stated in the Federal Register why "reactors" were used as the basis for assigning fees, instead of sites or facilities, the NRC commented that "[a]fter examining and analyzing the historical data available, the Commission has determined that the bulk of its licensee-related activities have and will continue to be directly related to the regulation of *large power reactors*." 51 Fed. Reg. at 24084 (emphasis added). Presumably, this statement provides the link between the decision to require fees for each reactor instead of the entire site or facility. In 1986, when this rule was originally considered, the NRC and the industry had no reason to foresee any need to word the rule differently. Almost all commercial nuclear power facilities in existence were large reactors, and a multiple modular facility had not yet been developed or approved.

10 CFR § 171.15(a) states that each person licensed to operate a power reactor shall pay an annual fee "for each unit for each license" held at any time during the Federal fiscal year in which the fee is due. In turn, Section 171.15(b) states that the 2000 Fiscal Year annual fee for "each operating power reactor" is $2,815,000. If each PBMR module is treated as a reactor, Section 171.15 would impose a separate fee for each module. Therefore, the annual fee for a 10-module PBMR would be almost $30,000,000. In contrast, the annual fee for an equivalent sized BWR or PWR would be less than $3,000,000. There is no basis for providing such disparate treatment to a PBMR facility.

For several reasons, NRC resources for regulating a 10-module PBMR facility will be similar to or lower than NRC resources for regulating a large BWR or PWR, and therefore NRC's annual fees for each should be similar. First, the PBMR modules at a site will have a single licensing basis. Second, the PBMR design will be simpler and safer than the design of a PWR or BWR. Finally, a PBMR facility will have a smaller workforce than existing reactors, thereby simplifying NRC's oversight responsibilities.

Furthermore, NRC assesses annual fees to recover its costs that cannot be assigned to any particular facility. *See* 51 Fed. Reg. at 24078. For this purpose, it would be unfair to assess higher fees for multiple modules that have a combined power level equivalent to a single large PWR or BWR. Higher fees would, in essence, penalize Exelon for selecting a modular design rather than a LWR design, and would serve to discourage development of a newer and safer technology.

For all of these reasons, it is reasonable and appropriate to treat multiple PBMR modules at a site as a single facility for purposes of assessing annual fees, and NRC

should initiate rulemaking to accomplish this goal. In order to implement this rulemaking, NRC should define the term "modular facility." Exelon suggests that the total size of a modular reactor facility be limited to no more than 1500 MWe (which would bound a PBMR facility, which is currently expected to consist of as many as ten modules each with a rating of between 100 and 150 MWe). Exelon believes that this provides a reasonable basis for defining a modular reactor facility in light of the current state of modular design technology and the size of current large scale PWRs and BWRs.

The previous paragraph provides a conceptual basis for rulemaking to modify Section 171.15. Exelon is working with the Nuclear Energy Institute to provide NRC with more detailed information to support rulemaking on this issue.

Resolution of this issue is not necessary for licensing or design certifications of the PBMR. However, this issue does have a significant impact on the economic feasibility of the PBMR. Therefore, Exelon requests NRC to indicate whether it is conceptually willing to initiate such rulemaking or other alternatives for accomplishing the same object (such as granting an exemption to the PBMR, or creating special annual fee provisions for modular reactors).

OPERATOR STAFFING REQUIREMENTS UNDER 10 CFR § 50.54(m) AS APPLICABLE TO A PEBBLE BED MODULAR REACTOR (PBMR) FACILITY

I. ISSUE:

10 CFR § 50.54(m) specifies minimum licensed operator staffing requirements. However, it does not identify staffing requirements for sites with more than two units with a common control room. Moreover, Section 50.54(m) contains requirements on the location of operators; i.e., it requires that one senior reactor operator (SRO) be in the control room of a unit during operation, that one reactor operator (RO) be at the controls for each unit during operation, and that a SRO be present during fuel handling. If NRC were to treat each PBMR module as a separate unit, the staffing requirements in Section 50.54(m) would be excessive and unnecessary. This paper discusses a process for specifying more reasonable operator staffing requirements.

II. EXELON'S PROPOSAL:

1) The first PBMR license application and the PBMR design certification application will propose and justify licensed operator staffing requirements for three or more PBMR modules at a site with a common control room. Because Section 50.54(m) currently does not contain any requirements for such configurations, approval of such staffing requirements will not require an exemption.

2) For operation involving the first two PBMR modules, the minimum staffing requirements in Section 50.54(m) are probably excessive. Additionally, the requirements in Section 50.54(m) on the location of SROs and ROs would be excessive if applied to a PBMR facility. Therefore, as part of its application, Exelon will request and justify an exemption from these requirements for the PBMR.

3) To avoid duplicative reviews for subsequent PBMR applications, the application for design certification of the PBMR under Part 52 will also specify licensed operator staffing requirements and request an exemption from Section 50.54(m).

III. ANALYSIS:

10 CFR § 50.54(m) identifies minimum staffing requirements for SROs and ROs for various plant modes. These staffing requirements vary, depending upon the number of "units" at a site and whether the units have a common control room. In general, for each shift with all units operating, the number of required ROs is 2U and the number of required SROs is U+1, where U is the number of units (with a decrease of one RO and SRO if there is a common control room). However, Section 50.54(m) does not specify staffing requirements for more than two units at a site with a common control room.

In addition to these requirements, Section 50.54(m) also specifies the following staffing requirements:

- Each licensee shall have at its site a person holding a senior operator license for all fueled units at the site who is assigned responsibility for overall plant operation at all times there is fuel in any unit. If a single senior operator does not hold a senior operator license on all fueled units at the site, then the licensee must have at the site two or more senior operators, who in combination are licensed as senior operators on all fueled units.

- When a nuclear power unit is in an operational mode other than cold shutdown or refueling, as defined by the unit's technical specifications, each licensee shall have a person holding a senior operator license for the nuclear power unit in the control room at all times. In addition to this senior operator, for each fueled nuclear power unit, a licensed operator or senior operator shall be present at the controls at all times.

- Each licensee shall have present, during alteration of the core of a nuclear power unit (including fuel loading or transfer), a person holding a senior operator license or a senior operator license limited to fuel handling to directly supervise the activity and, during this time, the licensee shall not assign other duties to this person.

In general, the formula used to develop the staffing levels in Section 50.54(m), and the requirements on the location of operators in Section 50.54(m), are excessive for PBMRs. These staffing requirements were developed when all operating nuclear power plants relied on active safety systems to mitigate accidents. Since the PBMR is a passive plant that does not require early operator intervention to mitigate accidents, staffing levels less than those indicated in Section 50.54(m) are appropriate for the PBMR.

As the Commission recognized when it promulgated Section 50.54(m) in the aftermath of the Three Mile Island incident, an exemption from the staffing requirements may be warranted to provide for "reduced staffing levels based on plant size, lack of complexity, or other unique factors." 48 Fed. Reg. 31611 (July 11, 1983). The first PBMR license application and design certification application will justify a reduced staffing level.

Section 50.54(m) currently does not contain any staffing requirements for more than two units at a site with a common control room. Therefore, no exemption will be needed to specify minimum staffing requirements for operation of three or more modules with a common control room. In contrast, Section 50.54(m) provides minimum staffing requirements applicable to two units with a common control room and contains requirements regarding the location of ROs and SROs. If a module is treated as a "unit," an exemption from these requirements will be needed to provide for lower staffing. Such an exemption will be requested as part of the application for the license for the first PBMR facility and the design certification rule for the PBMR.

DECOMMISSIONING COST ESTIMATE FOR A PEBBLE BED MODULAR REACTOR (PBMR) FACILITY

I. ISSUE:

10 CFR § 50.75(c) specifies a minimum amount for the decommissioning fund for boiling water reactors (BWRs) and pressurized water reactors (PWRs). However, this section does not specify a minimum amount for the required decommissioning fund for a gas cooled reactor.

II. EXELON'S PROPOSAL:

The first PBMR license application will include a cost estimate for decommissioning a PBMR module.

III. ANALYSIS:

10 CFR § 50.75(c) specifies a minimum amount for the decommissioning fund for BWRs and PWRs but not for a gas cooled reactor. Because the design of the PBMR is significantly different than the design of a BWR or PWR, neither of the cost estimates currently in Section 50.75(c) is appropriate for a PBMR module.

Therefore, the license application for the PBMR will include a decommissioning cost estimate. Because construction of the PBMR modules at a site will most likely be staggered, and because the PBMR modules might be decommissioned at different times, the cost estimate will apply to decommissioning of a single PBMR module.

5/10/01

CONSIDERATION OF THE ENVIRONMENTAL IMPACTS OF THE FUEL CYCLE AND TRANSPORTATION AS APPLICABLE TO A PEBBLE BED MODULAR REACTOR (PBMR) FACILITY

I. ISSUE:

10 CFR §§ 51.51 and 51.52 (Tables S-3 and S-4) specify the environmental impacts attributable to the fuel cycle and transportation for light water reactors (LWRs) but not for other types of reactors. As a result, this issue is unresolved for the PBMR.

Additionally, 10 CFR § 51.23 resolves issues related to the environmental impacts of storage of spent fuel following cessation of reactor operation until a mined geologic repository is available to dispose of the spent fuel (the "waste confidence" rule). This paper addresses whether such resolution applies to spent fuel generated by a PBMR.[1]

II. EXELON'S PROPOSAL:

1) In the first PBMR application, Exelon will identify the environmental impacts attributable to the fuel cycle and transportation for a PBMR facility.

2) Based upon the resolution of these issues for the first PBMR application, NRC should initiate rulemaking to create tables for the PBMR that are similar to Tables S-3 and S-4.

3) Long term onsite storage of spent fuel beyond the licensed lifetime of the PBMR is not a concern under the NRC's Waste Confidence Rule in 10 CFR § 51.23.

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[1] It is expected that the PBMR will use 8% enriched Uranium-235 fuel, which is classified as low enriched uranium (LEU) fuel under 10 CFR § 50.2. The only regulation that imposes more restrictive requirements on 8% enriched fuel than on the 4% enriched fuel typically used in

LWRs is 10 CFR § 50.68(b), which requires a criticality monitoring system for use, handling, and storage of fuel assemblies with an enrichment greater than 5%.

III. ANALYSIS:

A. Tables S-3 and S-4

Since Tables S-3 and S-4 in 10 CFR §§ 51.51 and 51.52 are limited to LWRs, issues related to the environmental impacts attributable to the fuel cycle and transportation have not been resolved by rulemaking for other types of reactors.

As a result, as part of the first PBMR application, Exelon will provide information on the environmental impacts of the fuel cycle and transportation attributable to a PBMR facility.

Once this issue has been resolved for the first PBMR application, NRC should initiate rulemaking to eliminate the need for duplicative reviews of this same information for subsequent PBMR applications. Since these impacts are generic for all PBMR facilities (and any comparable facilities), the results of the evaluation of these impacts for the first PBMR application should serve as the basis for the rulemaking. This rulemaking could entail the addition of tables to Part 51 similar to the existing Tables S-3 and S-4, or this issue could be resolved as part of the design certification rulemaking for the PBMR.

B. Waste Confidence Rule

In the early 1980s, the NRC conducted a generic rulemaking to assess the degree of assurance that radioactive wastes could be disposed of safely, to determine whether disposal or offsite storage would be available, and to determine whether the waste could be stored safely at reactor sites beyond the expiration of existing facility licenses until offsite disposal or storage is available.

The rulemaking came to be known as the "Waste Confidence" proceeding. On August 31, 1984, the NRC published five findings, accompanied by a final rule (codified

at 10 CFR § 51.23) that incorporated the findings as the basis for excluding case-by-case consideration of environmental effects of extended onsite storage of spent fuel in reactor and spent fuel storage facility licensing proceedings. *See* 49 *Fed. Reg.* 34658, 34688. The NRC's Waste Confidence Rule, as revised,[2] states that:

> The Commission has made a generic determination that, if necessary, spent fuel generated in any reactor can be stored safely and without significant environmental impacts for at least 30 years beyond the licensed life for operation (which may include the term of a revised or renewed license) of that reactor at its spent fuel storage basin or at either onsite or offsite independent spent fuel storage installations. Further, the Commission believes there is reasonable assurance that at least one mined geologic repository will be available within the first quarter of the twenty-first century, and sufficient repository capacity will be available within 30 years beyond the licensed life for operation of any reactor to dispose of the commercial high-level waste and spent fuel originating in such reactor and generated up to that time.

10 CFR § 51.23(a) (emphasis added). This provision does not distinguish between types of spent fuel.[3] Additionally, in making its findings in support of the Waste Confidence Rule, the Commission explicitly considered non-LWR fuel, including fuel from gas cooled reactors. *See, e.g.,* 49 Fed. Reg. at 34663 and 34683. Accordingly, the Waste Confidence Rule is broad enough to cover fuel irradiated in a gas-cooled reactor like the PBMR.

Furthermore, as a practical matter, there should be a repository available long before the end of the licensed lifetime of the PBMR. The Waste Confidence Rule states

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[2] The NRC recently reaffirmed its decision in the Waste Confidence Rulemaking, finding that there have been "no major shifts in national policy, no major unexpected institutional developments, [and] no unexpected technical information . . . that would cast doubt on the Commission's Waste Confidence findings . . . ." 64 *Fed. Reg.* 68005, 68007 (Dec. 6. 1999).

[3] Part 51 does not define "spent fuel." The closest definition is "spent nuclear fuel" in 10 CFR Part 2, Subpart K, governing hearing procedures for expansion of spent nuclear fuel storage capacities. *See* 10 CFR 2.1105. That definition states that spent nuclear fuel means "fuel that has been withdrawn from a nuclear reactor following irradiation, the constituent elements of which have not been separated by reprocessing." *Id.* This definition also does not distinguish between the

that there is reasonable assurance that a repository will be available by the first quarter of the twenty-first century (i.e., by 2025). In contrast, Exelon does not expect that the first PBMR will begin operation in the United States until 2006. Given a 40-year licensed lifetime for the PBMR, the license for the first PBMR would not expire until 2046 at the earliest - - long after the repository is expected to be available.

Under the Nuclear Waste Policy Act (NWPA), 42 U.S.C. §§ 10101 *et seq.*, the Department of Energy (DOE) will be required to accept irradiated PBMR fuel. The NWPA makes the federal government responsible for permanent disposal of spent nuclear fuel. 42 U.S.C. § 10131(4). To carry out this responsibility, the NWPA authorizes the Secretary of the DOE to enter into contracts with any person who generates, among other things, "spent nuclear fuel." 42 U.S.C. § 10222(a)(1). For civilian nuclear power plants, these contracts provide payment of fees in exchange for DOE's "acceptance of title, subsequent transportation, and disposal of . . . spent fuel." *Id.*

Nothing in the NWPA excludes irradiated PBMR fuel. The federal government's obligation applies to "spent nuclear fuel," which is defined as "fuel that has been withdrawn from a nuclear reactor following irradiation, the constituent elements of which have not been separated by reprocessing." *See* 42 U.S.C. §§ 10102(23), 10222. Also, the contract mechanism which applies to civilian nuclear power reactors would include any "power plant required to be licensed as a utilization facility under section 103 or 104(b) of the Atomic Energy Act of 1954." *See* 42 U.S.C. § 10102(6). Since the irradiated PBMR fuel meets the definition of "spent nuclear fuel," and the PBMR itself

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type of fuel generated in the reactor. Accordingly, under NRC regulations, the type of fuel generated -- whether LWR or PBMR fuel -- should not affect the Waste Confidence Rule.

will be licensed pursuant to Section 103 of the Act, DOE would be required to enter into a contract with Exelon for the ultimate disposal of the irradiated PBMR fuel.

The DOE's regulations implementing the contract requirement explicitly support this position. DOE regulations in 10 CFR § 961.1 clarify that DOE "will make available nuclear waste services to the owners and generators of spent nuclear fuel," and that "DOE will take title to, transport, and dispose of spent nuclear fuel . . . delivered to DOE by those owners of generators who execute the contract" set forth in 10 CFR § 961.11. This contract explicitly states that:

> the DOE has the responsibility following commencement of operation of a repository to take title to the spent nuclear fuel [SNF] or high-level radioactive waste [HLW] involved as expeditiously as practicable upon the request of the generator or owner of such waste or spent nuclear fuel.

Furthermore, Article I.18 of the contract states that the contract "applies to the delivery by Purchaser to DOE of SNF and/or HLW of domestic origin from civilian nuclear power reactors." Finally, Appendix E.4 of the contract explicitly states that such fuel includes "non-LWR fuel" (which is classified as nonstandard fuel under the contract). Thus, the standard DOE contract explicitly encompasses non-LWR fuel such as PBMR fuel, and DOE is required to accept such fuel from licensees who execute DOE's standard contract.

In summary, the Nuclear Waste Policy Act requires DOE to take title to and dispose of spent PBMR fuel. Since NRC expects the DOE repository to be in operation by the time the license for the first PBMR facility expires, long term storage of spent fuel from a PBMR does not represent a concern under the NRC's Waste Confidence Rule.

FINANCIAL QUALIFICATIONS FOR A LICENSE FOR A PEBBLE BED MODULAR REACTOR (PBMR) FACILITY

I. ISSUE:

10 CFR § 50.33(f) requires an applicant for a license to provide information on its financial qualifications, and Appendix C to Part 50 identifies the type of financial qualifications information that should be submitted. "Electric utilities" are excepted from the requirement to submit financial qualifications information. Exelon Generation is not an electric utility as defined in 10 CFR § 50.2 and therefore will be subject to the requirement to submit detailed financial qualifications information under Section 50.33(f). This requirement is burdensome and is unwarranted for applicants that have assets or parental guarantees.

II. EXELON'S POSITION:

1) For the first PBMR application, Exelon will submit the information required by Appendix C to Part 50. Exelon will submit estimates for total construction costs and total annual operating costs for each of the first five years of operation of the entire PBMR facility and the source of funds to cover such operating costs.

2) To avoid duplicative reviews for subsequent applications, the NRC should initiate rulemaking to revise its financial qualifications regulations to enable certain categories of merchant generating companies to have the same status as utilities. In particular, Section 50.33(f) should be revised to state that an applicant is financially qualified if it satisfies certain criteria.

III. ANALYSIS:

Section 182(a) of the AEA requires license applications to include such information on the financial qualifications of the applicant as the Commission may specify by regulation. The NRC's regulations governing financial qualification reviews for licenses to construct or operate nuclear power plants are contained in 10 CFR § 50.33(f).

For a non-electric utility to establish its financial qualifications, Appendix C to 10 CFR Part 50 requires the applicant for a construction permit provide at least three types of information: (1) an estimate of construction costs, (2) source of construction funds, and (3) the latest published annual financial reports, together with any current interim financial statements. An applicant for an operating license must submit information "that demonstrates the applicant possesses or has reasonable assurance of obtaining the funds necessary to cover estimated operation costs for the period of the license." *See* 10 CFR 50.33(f)(2). While the explicit terms of this regulation address "costs for the period of the license," in practice, this means that applicants must submit estimates for total construction costs and total annual operating costs for each of the first five years of operation of the facility and the source of funds to cover such operating costs. This could include projections of the market price of power, long-term contracts, and corporate revenues from other sources that may be used at the nuclear plants.

If the applicant is a newly-formed entity, Appendix C requires that additional financial information be submitted including: (1) the legal and financial relationships with stockholders, corporate affiliates, and others upon which the applicant is relying for financial assistance, (2) information to support the financial capability of parent

companies and corporate affiliates to meet their financial commitments, and (3) the applicant's statements of assets, liabilities, and capital structure as of the date of the application.

Exelon will supply the required information for the first PBMR application. However, the NRC should initiate rulemaking to establish specific criteria that would enable non-utilities to demonstrate financial qualifications without providing the detailed information currently required by NRC regulations and guidance. Exelon will work with the Nuclear Energy Institute to develop such criteria and provide more detailed information to support this rulemaking. This rulemaking should proceed independently of the licensing of the first PBMR.